

SERVICE  
MANUAL 2440

**marantz**

model 2440

adaptor *Quadradiat 4* amplifier

**TABLE OF CONTENTS**

<b>SECTION</b>	<b>PAGE</b>
Introduction .....	1
Service Notes .....	1
Mode Switch .....	1
Pre-Amplifiers .....	1
Balance Control .....	2
Main Amplifier .....	2
Meter Amplifier .....	2
Power Supply .....	2
Trouble Analysis .....	2
Power Amplifier Adjustment .....	3
Automatic Voltage Regulator Adjustment .....	3
Level Meter Adjustment .....	3
Performance Verification .....	3
Test Equipment Required for Servicing .....	4
Parts List .....	17
Technical Specifications .....	24

**LIST OF ILLUSTRATIONS**

<b>FIGURE NO.</b>	<b>PAGE</b>
1. AC Power Control Box Simplified Schematic .....	6
2. Amplifier Output Load Box Simplified Schematic .....	6
3. Front Panel Adjustment and Component Locations .....	7
4. Main Chassis Component Locations (Top View) .....	7
5. Rear Panel Component Locations .....	8
6. Main Chassis Component Locations (Bottom View) .....	8
7. Front Channel Buffer Amplifier Assembly P100 Component Locations .....	9
8. Tone Control Unit Assembly P200 Component Locations .....	9
9. Balance Control Unit Assembly P300 Component Locations .....	10
10. Tone and Pre-Amplifier Assembly P400 Component Locations .....	10
11. Vari-Matrix Unit Assembly P500 Component Locations .....	11
12. Meter Amplifier Assembly P600 Component Locations .....	11
13. Power Amplifier Assembly P700 Component Locations .....	12
14. Power Supply Assembly P800 Component Locations .....	13
15. Schematic Diagram .....	15, 16

## INTRODUCTION

This service manual was prepared for use by Authorized Warranty Stations and contains service information for Marantz Model 2440 Solid-State Quadradial Adaptor-Amplifier.

Servicing information and voltage data included in this manual are intended for use by the knowledgeable and experienced technician only. All instruction should be read carefully. No attempt should be made to proceed without a good understanding of the operation in the circuits.

The parts lists furnish information by which replacement part may be ordered from the Marantz Company. A simple description is included for parts which can usually be obtained through local suppliers.

## 1. SERVICE NOTES

As can be seen from the circuit diagram the chassis of Model 2440 consists of the following units. Each unit mounted on a printed circuit board is described within the square enclosed by a bold dotted line on the circuit diagram.

1. Front Channel Buffer Amplifier ..... mounted on P.C. Board, P100
2. Tone Control Unit ..... mounted on P.C. Board, P200
3. Balance Control Unit ..... mounted on P.C. Board, P300
4. Tone Amplifier ..... mounted on P.C. Board, P400
5. Vari-Matrix Unit ..... mounted on P.C. Board, P500
6. Meter Amplifier ..... mounted on P.C. Board, P600
7. Power Amplifier ..... mounted on P.C. Board, P700
8. Power Supply ..... mounted on P.C. Board, P800

## 2. MODE SWITCH

MODE switch S004 has positions of, MONO, 2 CH, DISCRETE, VARI-MATRIX, and SQ DECODER.

In the MONO position, all input signals are mixed together and delivered to all four channels.

In the 2 CH position, each pair of input signals right-front (RF) and right-rear (RR) and left-front (LF) and left-rear (LR) are mixed together. The resultant signals (RF + RR) and (LF + LR) are delivered to the pairs of RF and RR and LF and LR channels, respectively.

In the DISCRETE position, each channel signal is separately routed to the corresponding channel.

In the VARI-MATRIX position, 2-channel stereo input signals are converted into quadraphonic signals through the vari-matrix circuit; the input right and left channel signals are fed directly to the LF and RF channels, while the signals to the LR and RR channels are synthesized from the 2-channel input signals under the control of the DIMENSION control. The LR and RR channel signal components are controlled by the DIMENSION control as shown below.

Dimension Control Setting	LR Output	RR Output
Minimum (FCCW)	LF + RF	RF + LF
Center	LF	RF
Maximum (FCW)	LF - RF	RF - LF

When the DIMENSION control is set to the minimum position the LR and RR channel signals become monophonic, to the center are stereophonic, and to the maximum are out of phase, thus providing vanished sound image positioning.

In the SQ DECODER position, signal sources encoded by the CBS SQ system are ideally decoded into 4-channel signals. Required for this operation is incorporation of the SQ Adaptor, Model SQA-1, into the Model 2440.

## 3. PRE-AMPLIFIERS

In the front channels, mode processed signals from the VOLUME control are applied to the buffer amplifiers where the signals are amplified for perfect compensation of the attenuation in the balance control section.

The rear-channel signals are fed to the tone control circuit for high and low frequency response adjustment. Tone controlled rear channel signals are then fed to the balance control section through the REMOTE CONTROL switch.

#### 4. BALANCE CONTROL

Front channel signals from the buffer amplifiers and rear channel signals from the tone control amplifiers are fed into the balance control circuit, in which the signals are controlled by three balancers: FRONT L-R, REAR L-R, and FRONT-REAR. By setting the front-rear balancer to the "front" side and the front left-right balancer to the "left" side, for example, only the front left channel is driven.

The balance control circuit is provided with the REMOTE CONTROL switch which makes the Model RC-4 Remote Control Box operative when set to the "REMOTE" position. In the "REMOTE" position the balancers on the Model 2440 become ineffective since signals are led to the Model RC-4. The volume level can be adjusted by the volume control either on the Model 2440 or Model RC-4. However, the maximum volume level available by adjustment of the Model RC-4 is determined by the MASTER VOLUME control on the Model 2440.

Balance controlled front channel signals are sent out from the front output terminals to feed the front channel amplifier and the rear channel signals are led to the main amplifier section for further power amplification.

#### 5. MAIN AMPLIFIER

Rear channel output signals of the balance control circuit are led to the main amplifiers.

Transistor H701 is the pre-driver and its output is connected to the transistor H703 through capacitor C711. The transistor H703 drives the inverter transistors H709 and H710 which, in turn, drive the power output stage consisting of H003 and H004.

Transistors H705 and H707 are current limiter operating as a power transistor protector. Excessive current flow in the power output stage is detected by the resistors R747 and R749 and the resultant variation is applied to the transistors H705 and H707 and makes them turned on. This operation results in decrease of the base biasing current for H709 and H710. In this way the current flow in the power output stage (H003 and H004) is restricted within a safe predetermined value.

#### 6. METER AMPLIFIER

A part of the front channel output signals are led to the meter amplifier and the amplified signals are then rectified into direct current to drive the front channel level meters, while a part of the rear channel output signals are rectified and energize the rear channel level meters.

#### 7. POWER SUPPLY

The power supply unit consisting of transistors H801 and H802, which operates as an automatic voltage regulator, provides +35V DC to all of the amplifiers except main amplifiers.

#### 8. TROUBLE ANALYSIS

- |                                     |                                                                             |
|-------------------------------------|-----------------------------------------------------------------------------|
| 1. Excessive line consumption       | a. Check for shorted H007.                                                  |
|                                     | b. Check for shorted transistor H001 through H004.<br>Check L001 for short. |
| 2. No line consumption or zero bias | a. Check line cord, fuse, shorted H005, H006, H713, H714.                   |
|                                     | b. Check for open rectifier H007.                                           |
| 3. Excessive hum and noise level    | a. Check filter capacitors C003, C703, C704.                                |
|                                     | b. Check for shorted transistor H802.                                       |
| 4. Parasitic oscillation            | a. Check for defective C713, C714, C723, C724, C725, C726.                  |



## 5. Improper clipping

- a. Check for proper adjustment R723, R724.

## 9. POWER AMPLIFIER ADJUSTMENT

1. Connect a VTVM to J713(+) and J717(−) and adjust the trimming resistor R729 until the VTVM reads 20mV DC. For the other channel connect the VTVM to J714(+) and J718(−) and adjust the R730 for the same reading.
2. Connect an oscilloscope across the speaker terminals. Apply an audio signal of 1KHz to the AUX jacks and increase the audio signal until the audio output on the scope begin to clip. Adjust the trimming resistor R723 for equal and symmetrical clipping. For the other channel adjust the R724.

## 10. AUTOMATIC VOLTAGE REGULATOR ADJUSTMENT

Connect a VTVM to J801(+) and J805(−) and adjust R801 until the VTVM reads 35.0V under no signal condition.

## 11. LEVEL METER ADJUSTMENT

With the MODE switch in "MONO" and the MASTER VOLUME control in maximum position (FCW), apply an audio signal of 1KHz 100mV to the left-front channel TAPE/AUX IN jack. Set the FRONT-REAR BALANCE control to mid position and adjust the FRONT L-R BALANCE control for LF=RF (at FRONT OUT terminal) and REAR L-R BALANCE control for LR=RR (at speakers terminal). Adjust R601, R602, R624, and R625 until each meter reads the reference level ("0" mark in red)

R601 corresponds to the left-front meter

R602 corresponds to the right-front meter

R624 corresponds to the left-rear meter

R625 corresponds to the right-rear meter

## 12. PERFORMANCE VERIFICATION

### Test Procedure

#### A. Test Equipment

Refer to Table 1 for required test equipment.

#### B. Preliminary Procedures

1. Make the test setup shown in Figure 1 with the instrument controls set in the following positions:

Line Switch	off
Variable-line switch	variable
Watt Meter Switch	on
Variac	0 (fully CCW)
Load	8 ohms (0.5 mfd— off)
Audio Generator	Frequency 1 KHz
Output	5V range
Gain Minimum	
AC Volt Meter	30V range

2. Make sure that connections between the resistive load and the system terminals of the Model 2440 have negligible resistance compared with the resistance of the load itself. Appreciable resistance in wiring adds to the total load, resulting in inaccurate measurements of output power.
3. Connect amplifier output to load and connect AC cord to line power.
4. Remove the top cover.

#### C. Total Hum and Noise Test

1. With shorting plugs connected to the TAPE/AUX IN jacks and an 8-ohm resistive load connected across the speaker system output terminals, connect a distortion analyzer across

the load.

NOTE: In this test and tests that follow, if distortion analyzer used does not contain a built-in voltmeter, a VTVM may be substituted.

2. Set the distortion analyzer controls for voltage measurements and apply power to the amplifier. Set the volume control fully CCW. Set the TAPE/AUX switch on (in).
3. If the distortion analyzer indicates more than 2.5mV, refer to the trouble analysis section of this manual.
4. Set the VOLUME control fully CW. If the distortion analyzer indicates more than 3.0mV refer to the trouble analysis section of this manual.

#### D. Maximum Power Output

1. Connect the audio oscillator to the TAPE/AUX input. Set audio oscillator frequency to 1KHz. Set TAPE/AUX switch on (in).
2. With the distortion analyzer connected across the output load (8 ohms), set the analyzer on the 30V AC scale.
3. Turn the analyzer on and increase the audio oscillator output to 190mV, and verify the analyzer indicates more than 12.7V.

#### E. Harmonic Distortion Test

1. Set the frequency of the audio oscillator and the distortion analyzer to 20KHz.
2. Set the controls of the analyzer for voltage measurement on the 30-volt scale.
3. Adjust the audio oscillator output level until the analyzer meter indicates 12.7 volts.
4. Switch the distortion analyzer to Set Level – Manual mode, and adjust SENSITIVITY for full scale reading on 0-1 scale.
5. Measure the total harmonic distortion with the analyzer and verify it is less than 0.3%.  
NOTE: Any parasitic oscillation in the amplifier will be displayed on the oscilloscope when capacitance is switched into the load.
6. Switch the distortion analyzer back to SET LEVEL MANUAL.  
(Do not adjust sensitivity of analyzer.)
7. Change the frequency of the audio oscillator and distortion analyzer to 1KHz. Adjust audio oscillator output as necessary to have a full scale reading on the 0-1 scale on the analyzer.
8. Measure the distortion, verifying it is no greater than 0.3%.
9. Repeat steps 7 and 8, changing frequency to 20 Hz.  
Distortion should be no more than 0.3%.
10. Check for parastic oscillations; there should be none.

#### F. Channel Separation

1. Set audio oscillator to 20KHz. Connect oscillator to channel LR TAPE/AUX input only, with shorting plug (10K ohm) in all the other channels TAPE/AUX input. Connect distortion analyzer to speaker output terminals channel LR.
2. Adjust oscillator output until distortion analyzer indicates 0 dB.
3. Measure channel RR output. Distortion analyzer should indicate –30 dB or greater.
4. If indication is less than –30 dB, adjust input wires to preamp board until reading is –30 dB or greater.

### 13. TEST EQUIPMENT REQUIRED FOR SERVICING

Table 1 lists the test equipment required for servicing the Model 2440 Quadradial 4 Adaptor Amplifier. The wattmeter, ac voltmeter, and variac may be assembled as a test fixture as shown schematically in Figure 1, and the load resistors and ac ammeter may be assembled into a second test fixture as shown in Figure 2.

Item	Manufacturer and Model No. (or equivalent )	Use
Distortion Analyzer	Hewlett Packard, Model 331A or 333A	Measures distortion and voltage of amplifier output.
Audio Oscillator	Weston Model CVO-100P (NOTE: Less than 0.02 percent residual distortion is required.)	Sinewave and squarewave signal source.
Oscilloscope	Tektronix, Model 503; Data, Model 555	Waveform analysis and troubleshooting.
VTVM	RCA Senior Volt-Ohmyst, Model WV-98C	Voltage and resistance measurements.
AC Wattmeter	Simpson, Model 390	Monitors primary power consumption of amplifier.
AC Ammeter (0 to 10 amps)	Commercial Grade	Monitors amplifier output under short circuit condition.
Line Voltmeter (0 to 150 vac)	Commercial Grade	Monitors potential of primary power to amplifier.
Variable Autotransformer (0 to 140 vac, 10 amps)	Powerstat, Model 116B	Adjusts level of primary power to amplifier.
Shorting Plug	Use phono plug with 600 ohms across center pin and shell.	Shorts amplifier input to eliminate noise pickup.
Power Supply Bleeder Resistor (10 ohms at 1 W)	Commercial Grade	Discharges power supply filter capacitors prior to disassembly or resistance measurements.
Output Load Resistor ( $8\Omega \pm 0.5\%$ , 250W)	Commercial Grade	Provides 8-ohm load for amplifier output termination.
Output Load Resistor ( $4\Omega \pm 0.5\%$ , 250W)	Commercial Grade	Provides 4-ohm load for amplifier output termination.
Output Load Capacitor (0.5 mfd)	Mylar	Provides capacitive load for instability checks.
AC Power Control Box	Optional Item. Fabricate in accordance with Figure 1.	Monitors and controls primary power for amplifier.
Amplifier Output Load Box	Optional Item. Fabricate in accordance with Figure 2.	Provides various amplifier loads and can monitor shorted output.

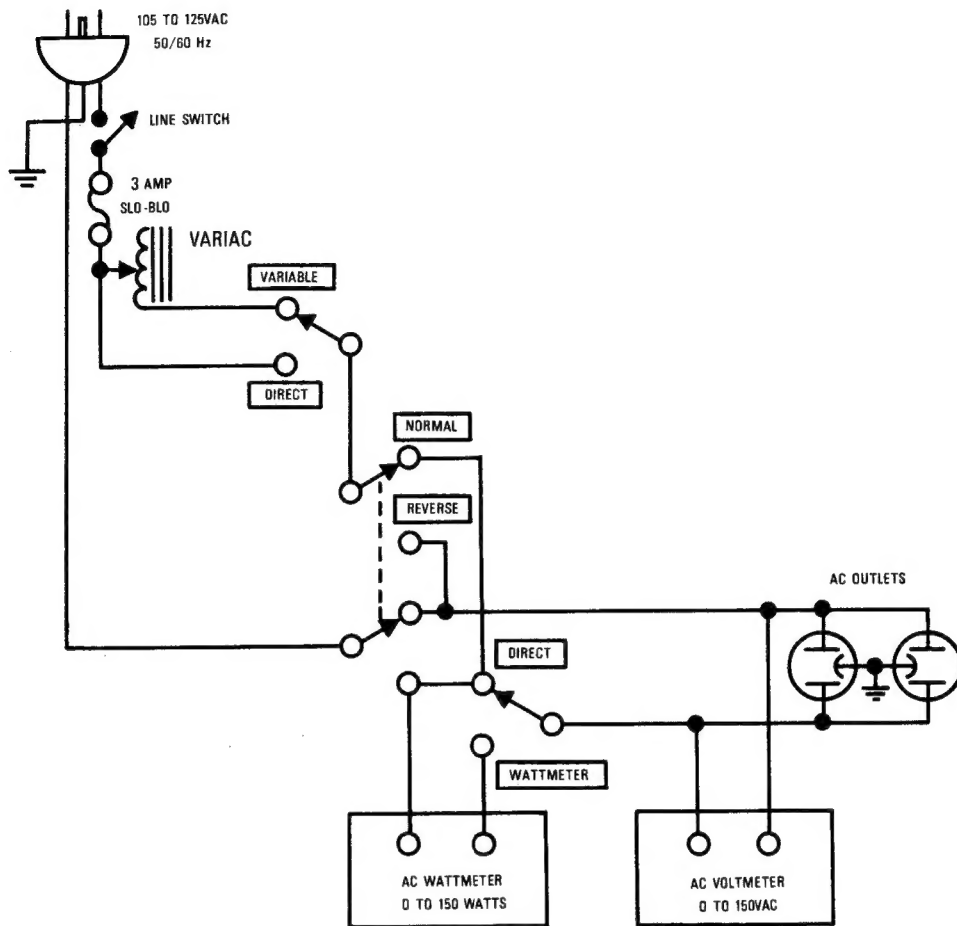


Figure 1. AC Power Control Box Simplified Schematic

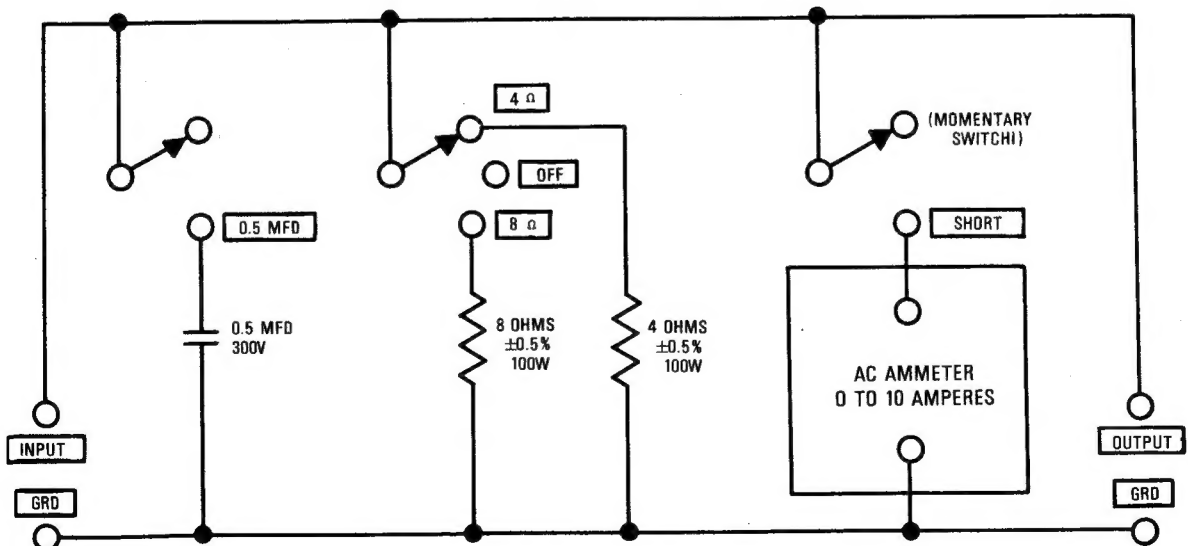


Figure 2. Amplifier Output Load Box Simplified Schematic



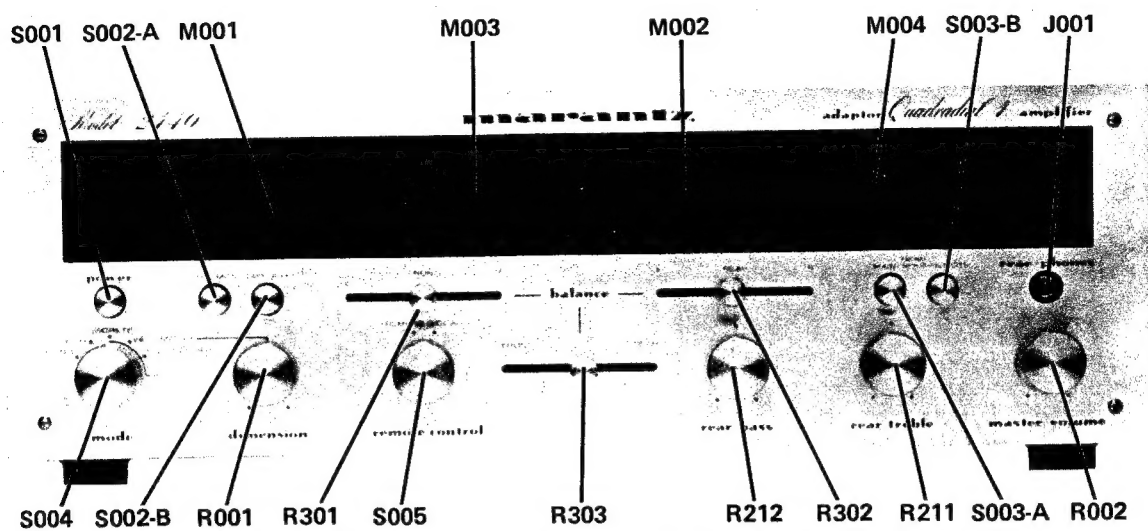


Figure 3. Front Panel Adjustment and Component Locations

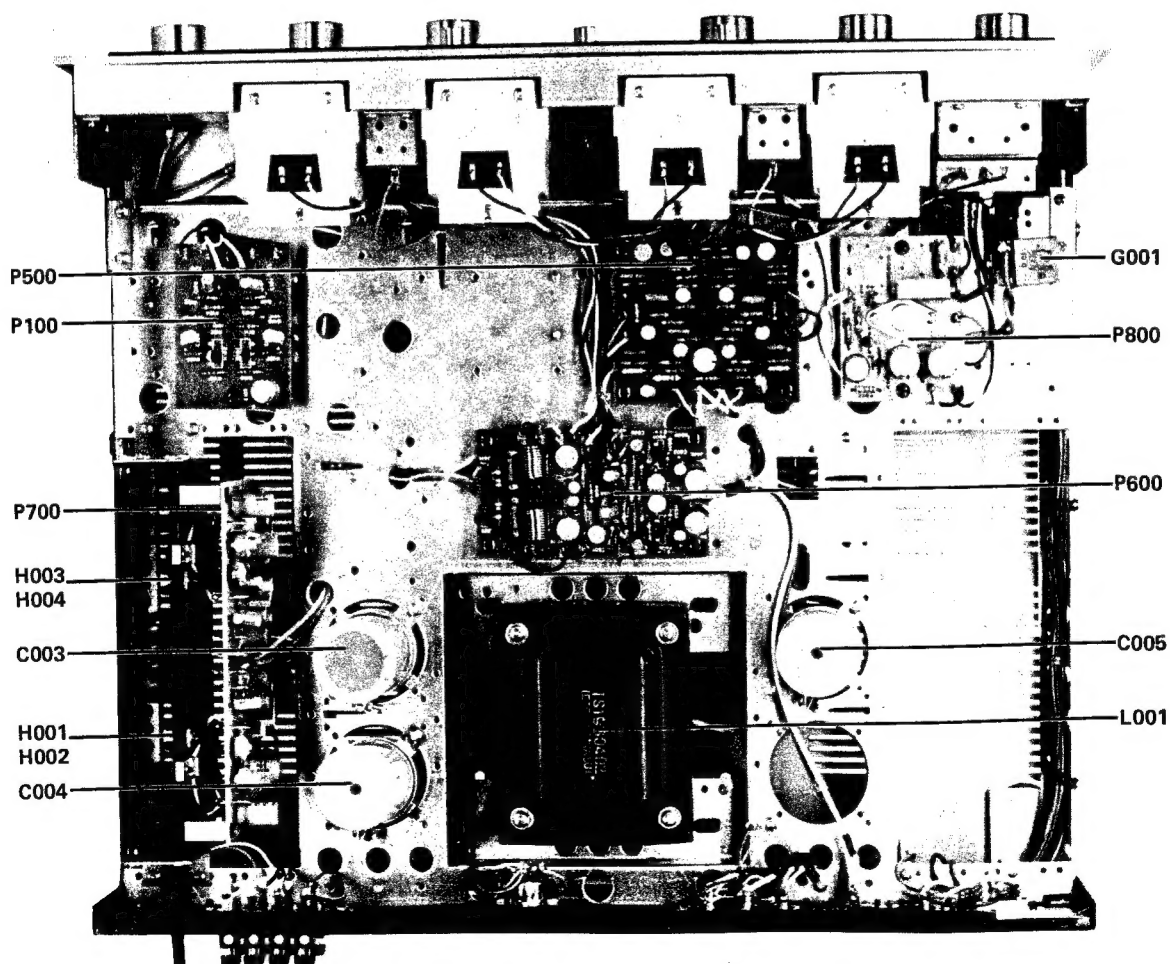


Figure 4. Main Chassis Component Locations (Top View)

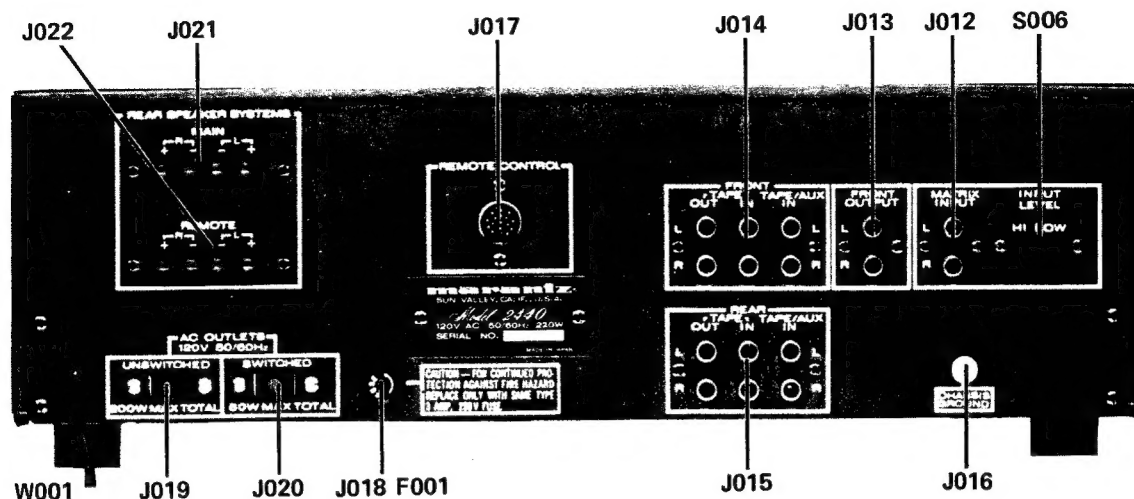


Figure 5. Rear Panel Component Locations

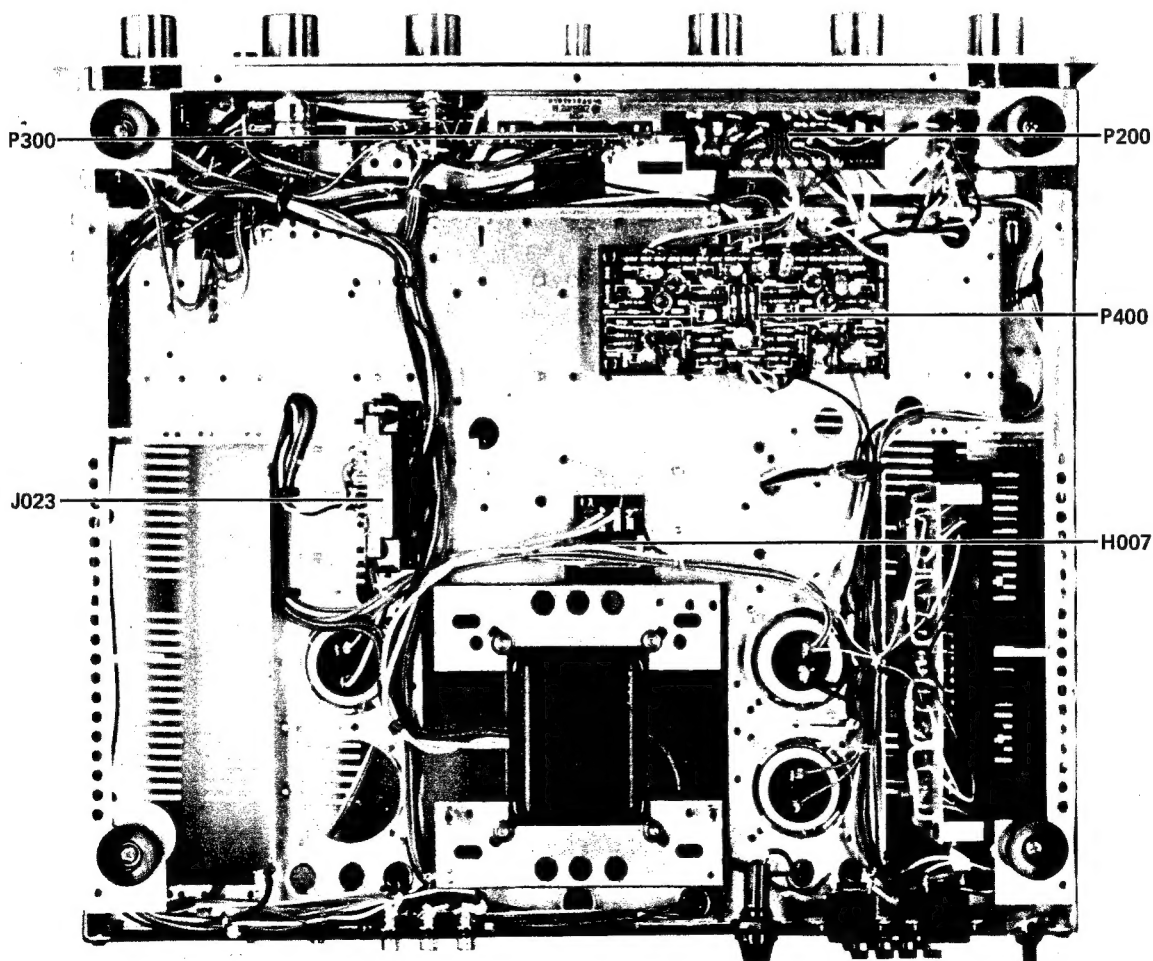


Figure 6. Main Chassis Component Locations (Bottom View)

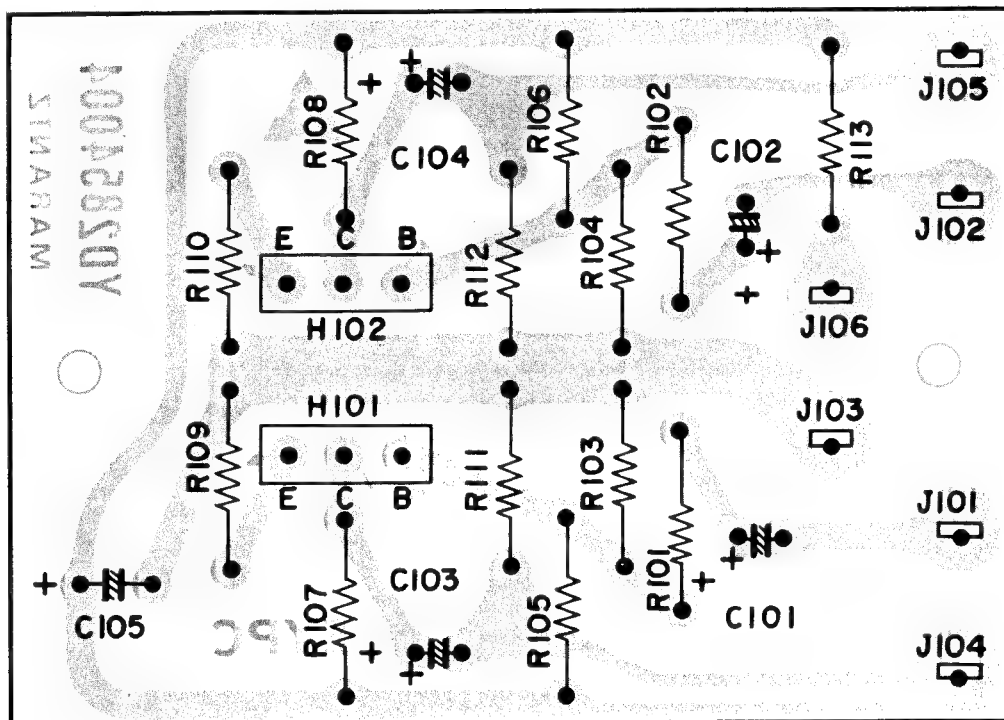


Figure 7. Front Channel Buffer Amplifier Assembly P100 Component Locations

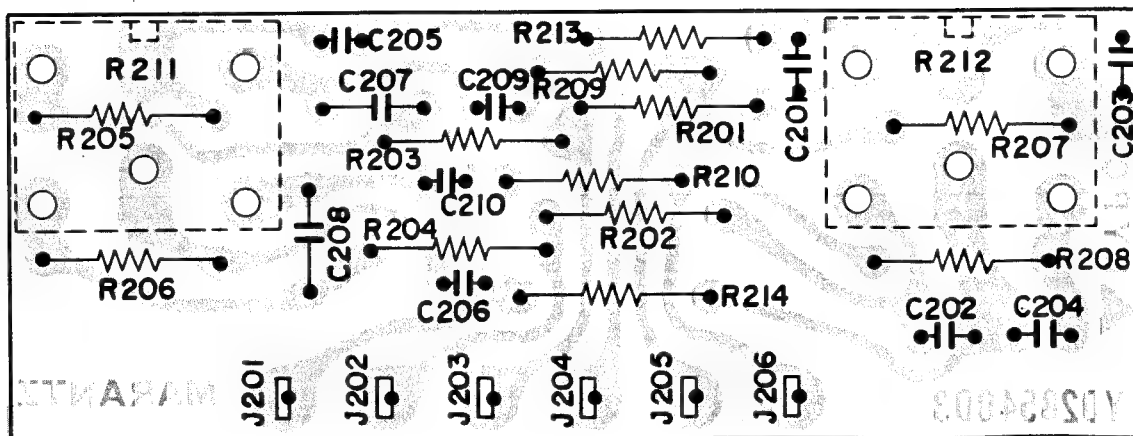


Figure 8. Tone Control Unit Assembly P200 Component Locations

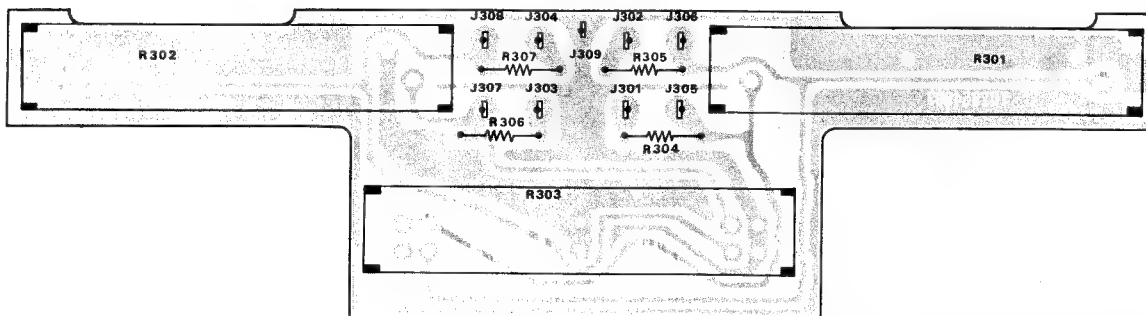


Figure 9. Balance Control Unit Assembly P300 Component Locations

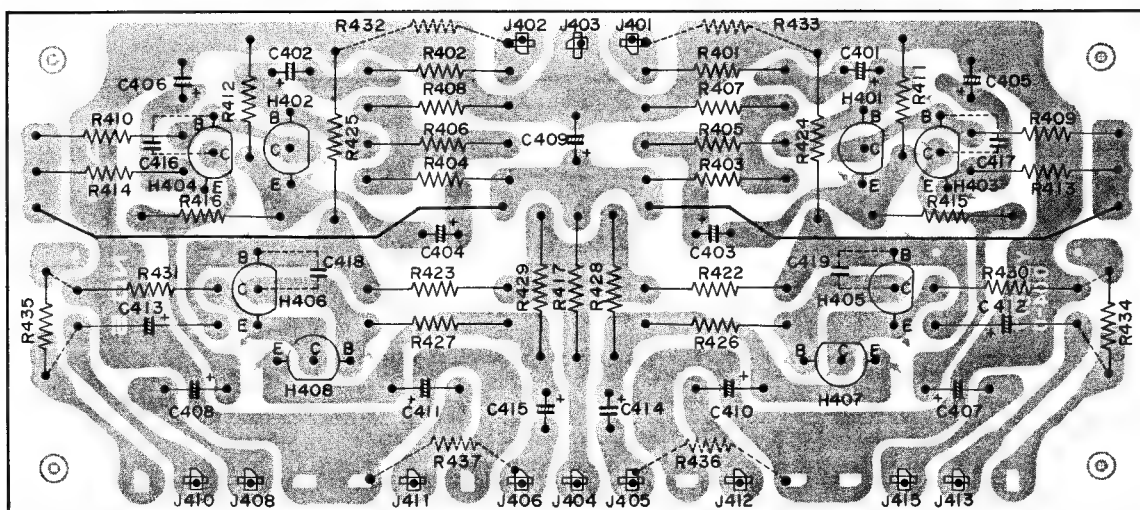


Figure 10. Tone and Pre-Amplifier Assembly P400 Component Locations

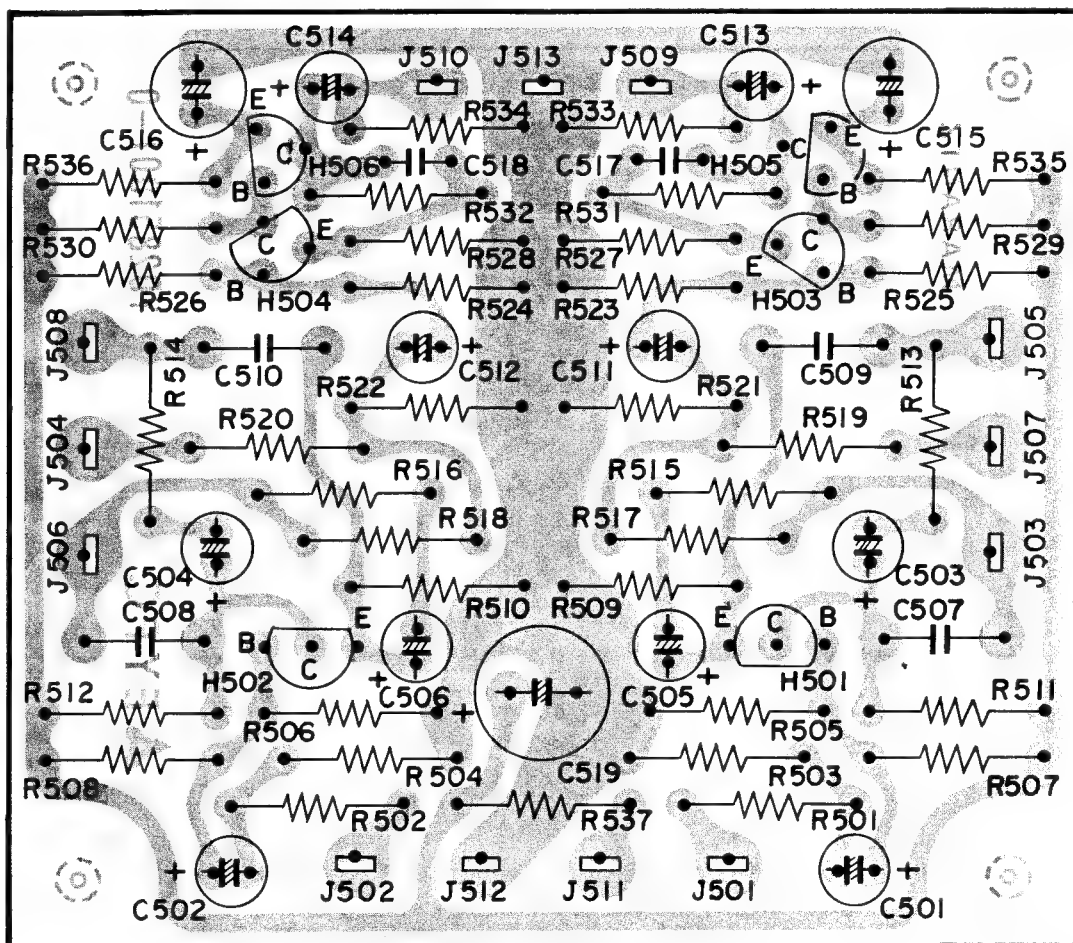


Figure 11. Vari-Matrix Unit Assembly P500 Component Location

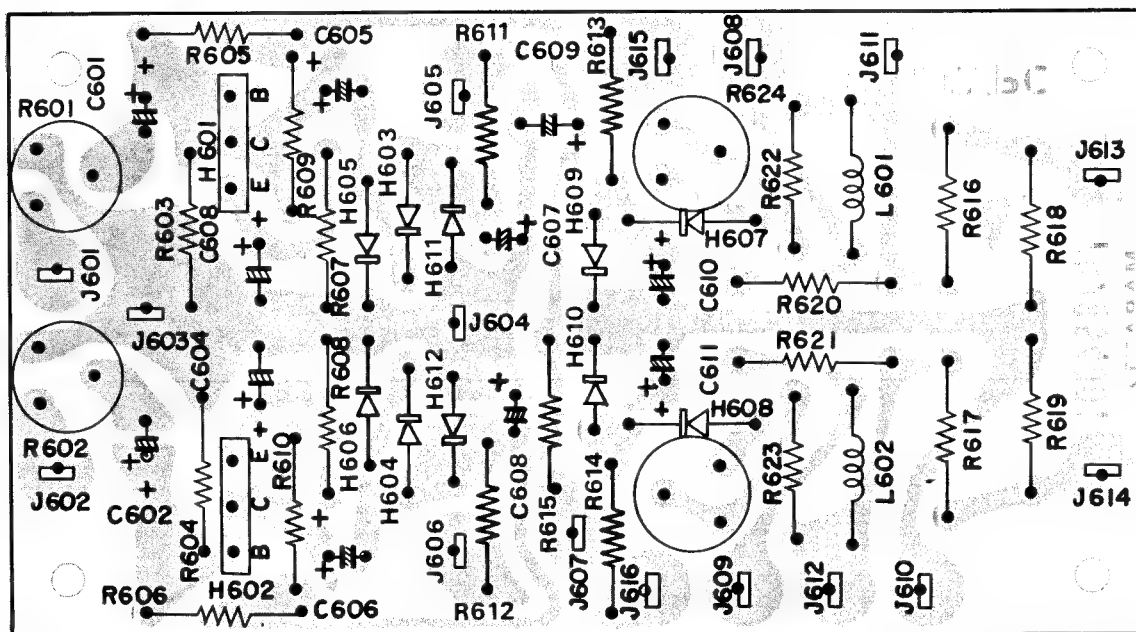


Figure 12. Meter Amplifier Assembly P600 Component Location



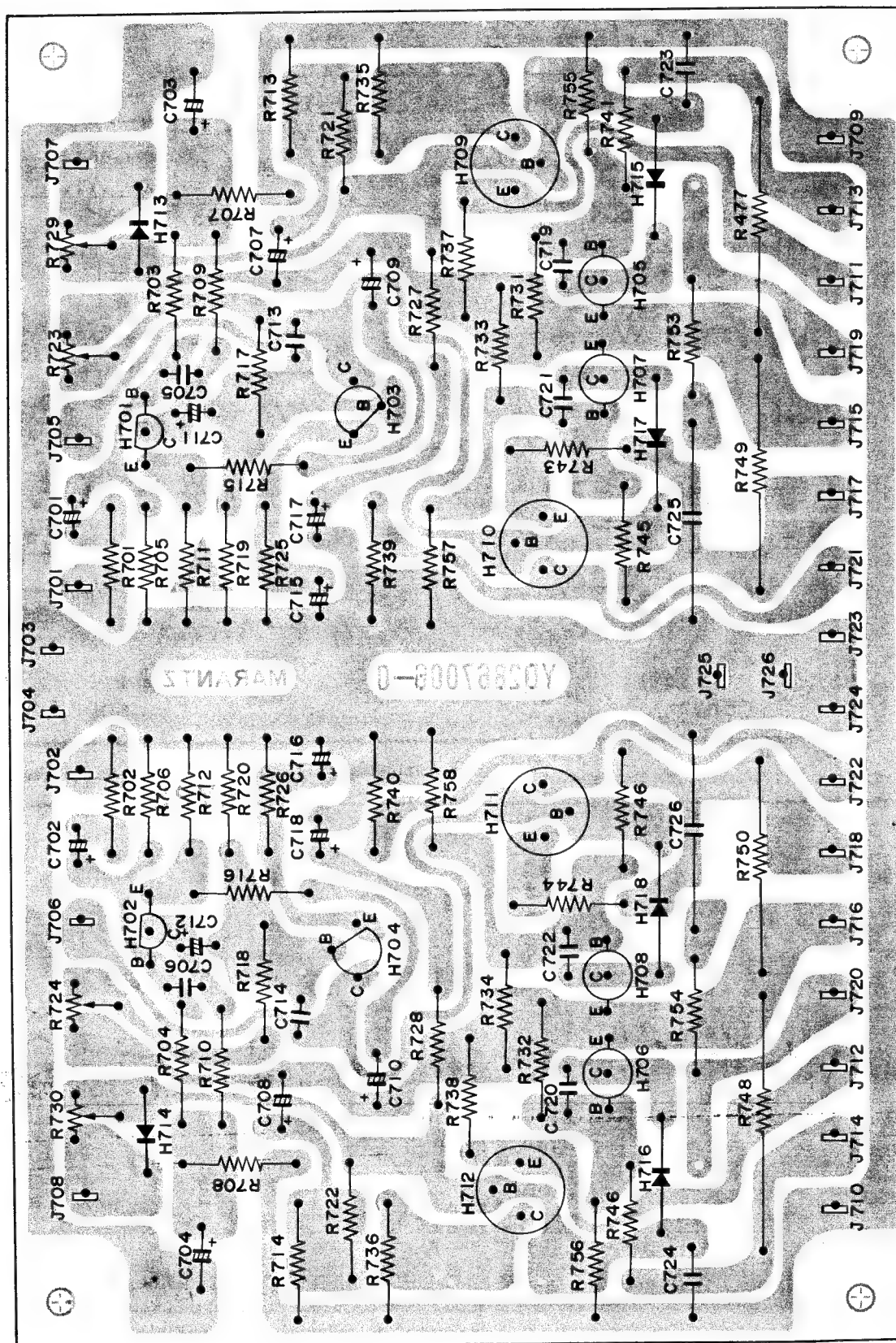


Figure 13. Power Amplifier Assembly P700 Component Locations

NOTE

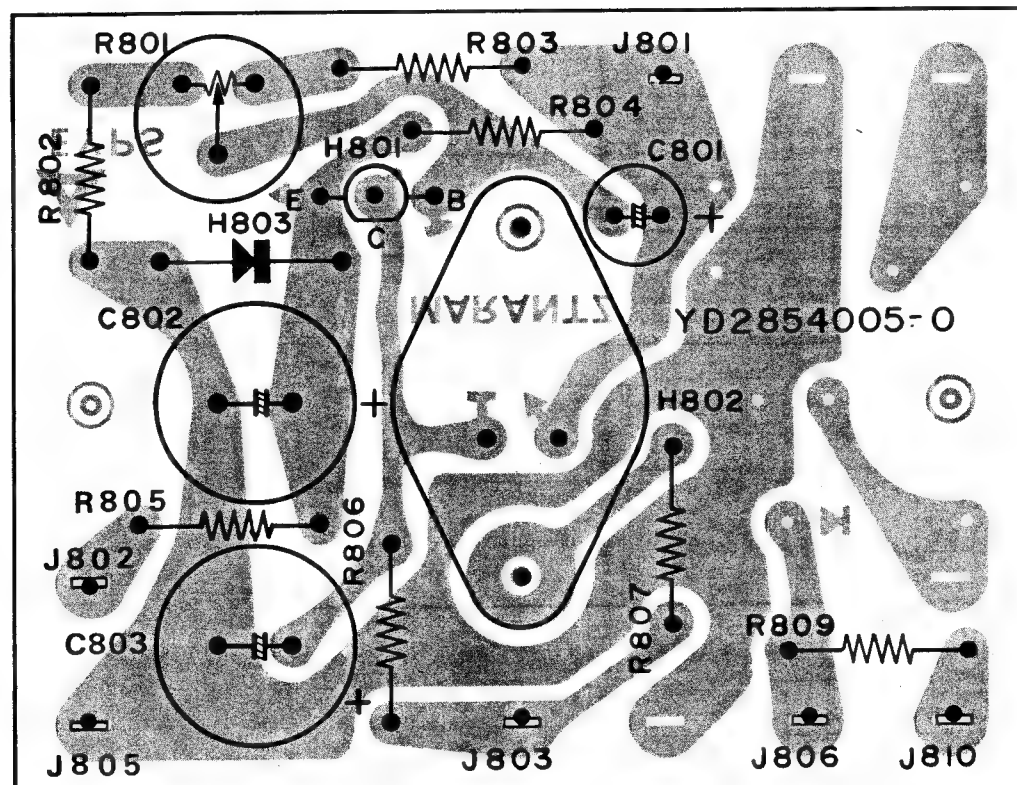
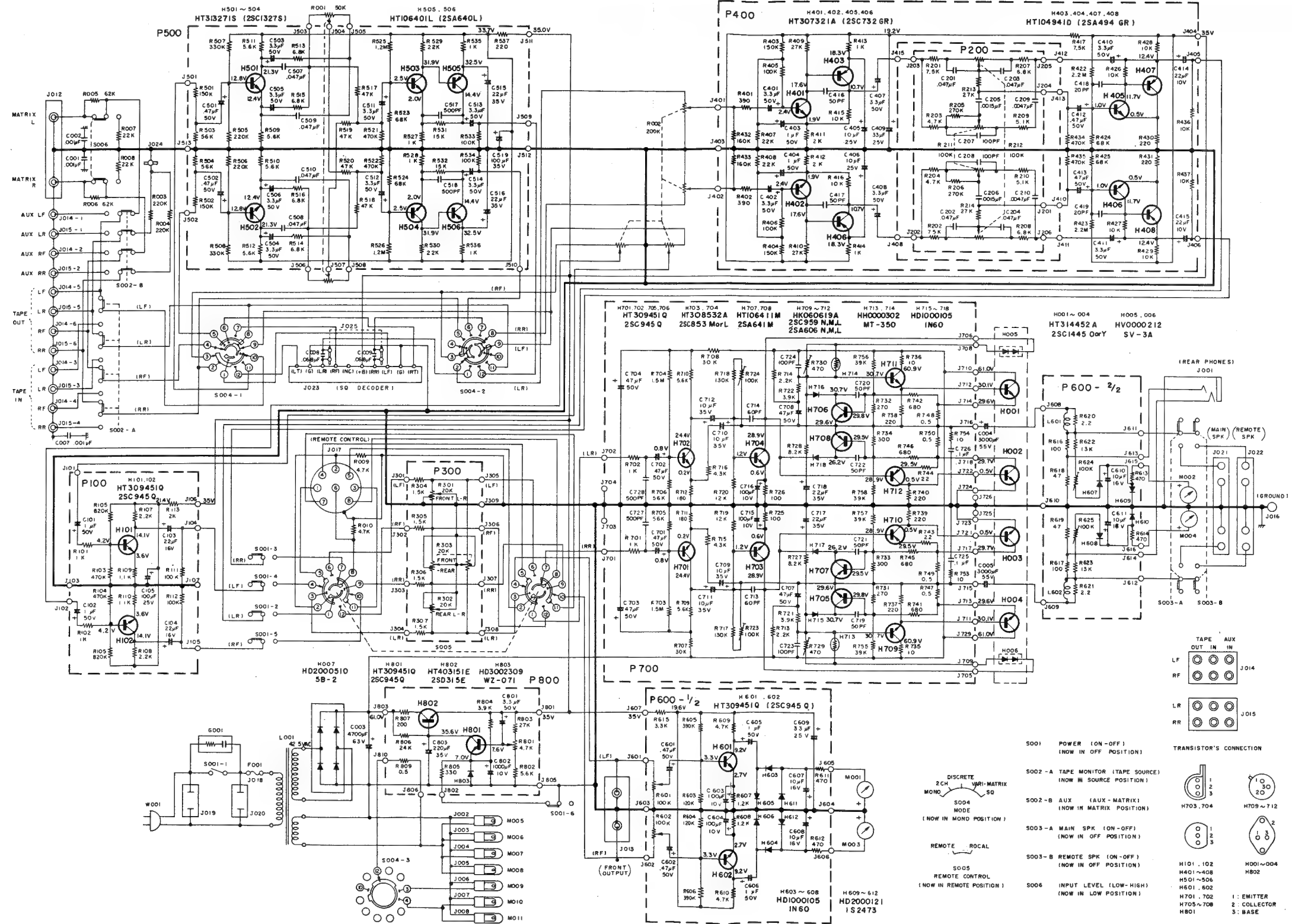


Figure 14. Power Supply Assembly P800 Component Locations





REF. DESIG.	MARANTZ PART NO.	DESCRIPTION
<b>SEMICONDUCTORS</b>		
H801	HT309451B	Transistor 2SC945 (Q)
H802	HT403151E	Transistor 2SD315 (E)
H803	HD3002309	Diode WZ-071
<b>MISCELLANEOUS</b>		
J801	YP1000099	Plug
J802	YP1000099	Plug
J803	YP1000099	Plug
J805	YP1000099	Plug
J806	YP1000099	Plug
J810	YP1000099	Plug
A	285406340	Front Panel Ass'y
0103	285406301	Escutcheon
0104	281840101	Frame
0105	285415801	Window
0106	281825905	Bush
0107	273125901	Bush
0108	285425901	Bush
0109	285405301	Cover
0403	285416050	Bracket K
0409	281816003	Bracket
0410	281816004	Bracket
0424	285410901	Shield
0507	285410701	Sheet
0505	285110701	Sheet
0604	51100305A	B.H.M. Screw
0606	51100305A	B. H. M. Screw
0608	51570305B	P. H. Tapt Screw
0610	51570306B	P. H. Tapt Screw
0612	51570306B	P. H. Tapt Screw
0614	51100406A	B. H. M. Screw
0620	51570306B	P. H. Tapt Screw
0622	51570306B	P. H. Tapt Screw
0623	54050300R	T. L. Washer OR
J023	YJ0700006	Jack
1011	285110450	Retainer K
1119	51100312S	B. H. M. Screw
J002	YJ0800019	Lamp Holder
J003	YJ0800019	Lamp Holder
J004	YJ0800019	Lamp Holder
J005	YJ0800019	Lamp Holder
M005	IN1008007	Lamp
M006	IN1008007	Lamp
M007	IN1008007	Lamp
M008	IN1008007	Lamp
0413	285427401	Reflector
0414	285427101	Holder
0627	54050300R	T. L. Washer
0616	51570305B	P. H. Tapt Screw
0626	51100306A	B. H. M. Screw
J006	YJ0800019	Lamp Holder
0417	285327402	Reflector
0418	285327102	Holder

REF. DESIG.	MARANTZ PART NO.	DESCRIPTION
0618	51570305B	P. H. Tapt Screw
0630	51100305A	B. H. M. Screw
0436	54050300R	T. L. Washer OR
0437	62031650W	Lug
M009	IN1008007	Lamp
0421	285427402	Reflector
M010	IN1008007	Lamp
J007	YJ0800019	Holder
0637	51570305B	P. H. Tapt Screw
J035	YJ0800013	Jack
0435	285427402	Reflector
M011	IN1008007	Lamp
J008	YJ0800019	Holder
0638	51570305B	P. H. Tapt Screw
J029	YJ0800013	Jack
0427	285410902	Shield
0428	281912002	Insulator
J025	YL0105003	Terminal
C008	DF1768301	Capacitor Film 0.068 $\mu$ F $\pm$ 20% 50V
C009	DF1768301	Capacitor Film 0.068 $\mu$ F $\pm$ 20% 50V
S005	SR0802002	Rotary Switch
S004	SR0905001	Rotary Switch
S001	SP0701001	Push Switch
G001	BF1040001	Printed Compo
M001	IM1104205	DC Meter Front Left
M002	IM1104205	DC Meter Rear Left
M003	IM1104205	DC Meter Front Right
M004	IM1104206	DC Meter Rear Right
J001	YJ0100065	Jack
S003	SP0402004	Push Switch
P300	YD2854002	P. C. Board Balance VR Ass'y
	ZZ2854002	P. C. Board Ass'y
<b>RESISTORS</b>		
R301	RX0203013	Variable 20K $\Omega$ Front L-R
R302	RX0203013	Variable 20K $\Omega$ Rear L-R
R303	RS0203005	Variable 20K $\Omega$ X2 Front-Rear
R304	RT0515214	1.5K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R305	RT0515214	1.5K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R306	RT0515214	1.5K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R307	RT0515214	1.5K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
<b>MISCELLANEOUS</b>		
J301	YP1000099	Plug
J302	YP1000099	Plug
J303	YP1000099	Plug
J304	YP1000099	Plug
J305	YP1000099	Plug
J306	YP1000099	Plug
J307	YP1000099	Plug
J308	YP1000099	Plug
J309	YP1000099	Plug
R001	RM0503050	Resistor Variable 50K $\Omega$ BX2 DC
R002	RG0204002	Resistor Variable 200K $\Omega$ BX4 VC
S002	SP0402004	Push Switch Tape Mon Tape/Aux

REF. DESIG.	MARANTZ PART NO.	DESCRIPTION
R003	RT0522414	Resistor 220K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R004	RT0522414	Resistor 220K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
J024	YL0102003	Terminal 2P
P200	YD2854003	P. C. Board T. C. Ass'y
	ZZ2854003	P. C. Board Ass'y
<b>RESISTORS</b>		
R201	RT0575214	7.5K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R202	RT0575214	7.5K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R203	RT0547214	4.7K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R204	RT0547414	4.7K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R205	RT0527414	270K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R206	RT0527414	270K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R207	RT0568214	6.8K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R208	RT0568214	6.8K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R209	RT0551214	5.1K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R210	RT0551214	5.1K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R211	RM0104007	Variable 100K $\Omega$ B X 2
R212	RM0104007	Variable 100K $\Omega$ B X 2
R213	RT0527314	27K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R214	RT0527314	27K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
<b>CAPACITORS</b>		
C201	DF1647301	Film 0.047 $\mu$ F $\pm$ 10% 50V
C202	DF1647301	Film 0.047 $\mu$ F $\pm$ 10% 50V
C203	DF1647301	Film 0.047 $\mu$ F $\pm$ 10% 50V
C204	DF1647301	Film 0.047 $\mu$ F $\pm$ 10% 50V
C205	DF1615201	Film 0.0015 $\mu$ F $\pm$ 10% 50V
C206	DF1615201	Film 0.0015 $\mu$ F $\pm$ 10% 50V
C207	DD1510101	Ceramic 100PF $\pm$ 5% 50V
C208	DD1510101	Ceramic 100PF $\pm$ 5% 50V
C209	DF1647201	Film 0.0047 $\mu$ F $\pm$ 10% 50V
C210	DF1647201	Film 0.0047 $\mu$ F $\pm$ 10% 50V
<b>MISCELLANEOUS</b>		
J201	YP1000094	Plug
J202	YP1000094	Plug
J203	YP1000094	Plug
J204	YP1000094	Plug
J205	YP1000094	Plug
J206	YP1000094	Plug
H007	HD2000510	Diode 5B-2
1023	138200503	Clamper

REF. DESIG.	MARANTZ PART NO.	DESCRIPTION
B	285416040	Rear Panel Ass'y
0703	285416001	Bracket
0709	281805501	Collar
0711	285116007	Bracket
S006	SS0202017	Slide Switch Input Level
J012	YT0202007	Terminal Matrix Input
J013	YT0202007	Terminal Front Out
J014	YT0206003	Terminal Aux Tape Front
J015	YT0206003	Terminal Aux Tape Rear
J016	YL0301021	Terminal Ground
J017	YJ1100012	Jack Remote Control
J019	YJ0400018	Jack AC Outlet
J020	YJ0400018	Jack AC Outlet
J021	YT0304002	Terminal Spk Main
J022	YT0304002	Terminal Spk Remote
0803	51100308S	B. H. M. Screw
0805	53110303E	Hexagon Nut
0807	55060307F	T. R. Rivet
0709	54050300R	T. L. Washer OR
0713	51100306S	B. H. M. Screw
0715	53110403E	Hexagon Nut
0716	62041760W	Lug
0717	54020401E	Flat Washer P
0718	54050400R	T. L. Washer OR
0720	51100312S	B. H. M. Screw
0721	53110303E	Hexagon Nut
0722	51100306S	B. H. M. Screw
0724	51100306S	B. H. M. Screw
0714	145525903	Bush
W001	YC0240010	AC Cord
J018	YJ0800012	Socket Fuse Holder
F001	FS1030003	Fuse 3A
<b>RESISTORS</b>		
R005	RT0562314	62K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R006	RT0562314	62K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R007	RT0522314	22K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R008	RT0522314	22K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R009	RT0547214	4.7K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
R010	RT0547214	4.7K $\Omega$ $\pm$ 5% $\frac{1}{4}$ W
<b>CAPACITORS</b>		
C001	DK1810201	Ceramic 0.001 $\mu$ F $\pm$ 100% 50V
C002	DK1810201	Ceramic 0.001 $\mu$ F $\pm$ 100% 50V
C007	DK1810201	Ceramic 0.001 $\mu$ F $\pm$ 100% 50V

# TECHNICAL SPECIFICATIONS

Rated Continuous (RMS) Power Output per Channel,  
Both Channels Operating Simultaneously, 20Hz to 20,000Hz .....20 Watts at 4 and 8 ohms  
10 Watts at 16 ohms  
Comparable Total Music Power (IHF) .....60 Watts at 8 ohms  
High-level Hum and Noise (ref. 20W at 8 ohms) .....-80 dB  
I.M. Distortion (SMPTE), at Rated Power .....0.3%  
Distortion decreases as power is lowered  
Total Harmonic Distortion, at Rated Power ..... 0.3% Maximum  
Distortion decreases as power is lowered  
Power Bandwidth (IHF) for 0.3% THD ..... 5 Hz to 45,000 Hz  
Damping Factor (ref. 8 ohms) ..... Greater than 45  
Input Sensitivity (for 20W at 8 ohms) .....150mV  
Input Impedance .....100K ohms  
Channel Separation 20Hz to 20,000Hz .....30 dB Minimum  
Front Channel Maximum Output Voltage for 1% THD ..... 1,000mV  
Front Channel Total Harmonic Distortion at 150mV Output ..... 0.1% Maximum  
Power Requirements ..... 120V AC  
At Rated Output, Both Channels Operating .....220 Watts  
Idling Power (Volume Control at Zero) .....20 Watts

## Dimensions

Panel Width .....17-21/64 Inches  
Panel Height .....5-25/64 Inches  
Depth .....14-3/8 Inches

## Weight

Unit alone ..... 24.2 lbs  
Packed for Shipment ..... 35 lbs

\* These specifications and exterior designs may be changed for improvement without advance notice.

REF. DESIG.	MARANTZ PART NO.	DESCRIPTION	REF. DESIG.	MARANTZ PART NO.	DESCRIPTION
W002	YW2854001	MISCELLANEOUS			
W003	YX2854001	Wire Material			
		Wire Material			
C003	EC4780631	Capacitor 4700μF +100% 63V - 10%	0202	285426501	Indicator
C004	EC3080552	Capacitor Electroly 3000μF +150% 55V - 10%	0206	285426505	Indicator
C005	EC3080552	Capacitor Electroly 3000μF +150% 55V - 10%	0207	285426506	Indicator
L001	TS1960402	Power Transf.	0711	51100306S	B. H. M. Screw
			0211	257886101	Label UL Caution
0128	275905701	Lug	0212	257886102	Label Do Not Remove Cover
0313	51100410A	B. H. M. Screw	0213	257886103	Label See Marking on Bottom
0314	54020401A	Flat Washer P			
0315	54040402A	Spring Washer	0217	281826506	Indicator Same as Line Voltage
1103	51570306B	P. H. Tapt Screw	0224	951020102	Label UL
1105	51570306B	P. H. Tapt Screw			
1107	51570306B	P. H. Tapt Screw	0503	285430201	Dial
1109	51570306B	P. H. Tapt Screw	0512	282111801	Spacer
1111	51100306S	B. H. M. Screw	0112	285325701	Lid
1112	51100306S	B. H. M. Screw	0132	285420201	Net
1113	51100306S	B. H. M. Screw	0133	285420202	Net
1114	51100306S	B. H. M. Screw	0134	285420203	Net
1115	51100306S	B. H. M. Screw	0135	285420204	Net
			0113	257711803	Spacer
1118	51100306S	B. H. M. Screw	C	285325740	Bottom Cover Ass'y
			0115	285325750	Lid K
1122	53110401A	Hexagon Nut	0118	285125703	Lid
1123	54040402N	Spring Washer	0130	51216059E	Screw
1124	54020401A	Flat Washer P			
1125	53110503A	Hexagon Nut	0119	282111801	Spacer
1127	51102606A	B. H. M. Screw	0122	281815401	Knob
1130	54050300R	T. L. Washer OR	0124	285015401	Knob
1131	62031650W	Lug	0126	281815403	Knob
1133	51570306B	P. H. Tapt Screw	0303	51122608E	T. H. M. Screw
1134	51570306B	P. H. Tapt Screw	0305	51100406S	B. H. M. Screw
			0309	51100406S	B. H. M. Screw
1003	285410550	Chassis K	0310	54020401S	Flat Washer P
1009	282110103	Support			
1016	281900501	Clamper			
1019	285310102	Support			
1020	54040402N	Spring Washer			
1026	273025901	Bush			



REF. DESIG	MARANTZ PART NO.	DESCRIPTION
<b>CAPACITORS</b>		
C701	EA4740501	Electroly 0.47 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C702	EA4740501	Electroly 0.47 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C703	EA4760509	Electroly 47 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C704	EA4760509	Electroly 47 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C707	EA4760509	Electroly 47 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C708	EA4760509	Electroly 47 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C709	EA1060359	Electroly 10 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 35V
C710	EA1060359	Electroly 10 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 35V
C711	EA1060359	Electroly 10 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 35V
C712	EA1060359	Electroly 10 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 35V
C713	DD1660001	Ceramic 60PF $\pm 10\%$ 50V
C714	DD1660001	Ceramic 60PF $\pm 10\%$ 50V
C715	EA1070109	Electroly 100 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 10V
C716	EA1070109	Electroly 100 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 10V
C717	EA2260359	Electroly 22 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 35V
C718	EA2260359	Electroly 22 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 35V
C719	DD1650001	Ceramic 50PF $\pm 10\%$ 50V
C720	DD1650001	Ceramic 50PF $\pm 10\%$ 50V
C721	DD1650001	Ceramic 50PF $\pm 10\%$ 50V
C722	DD1650001	Ceramic 50PF $\pm 10\%$ 50V
C723	DK1610150	Ceramic 100PF $\pm 10\%$ 500V
C724	DK1610150	Ceramic 100PF $\pm 10\%$ 500V
C725	DF1710452	Film 0.1 $\mu$ F $\pm 20\%$ 200V
C726	DF1710452	Film 0.1 $\mu$ F $\pm 20\%$ 200V
C727	DF1650101	Film 500PF $\pm 10\%$ 50V
C728	DF1650101	Film 500PF $\pm 10\%$ 50V
<b>SEMICONDUCTORS</b>		
H701	HT309451Q	Transistor 2SC945 (Q)
H702	HT309451Q	Transistor 2SC945 (Q)
H703	HT308532A	Transistor 2SC835 (Mor L)
H704	HT308532A	Transistor 2SC835 (Mor L)
H705	HT309451Q	Transistor 2SC945 (Q)
H706	HT309451Q	Transistor 2SC945 (Q)
H707	HT106411M	Transistor 2SA641 (M)
H708	HT106411M	Transistor 2SA641 (M)
H709	HT309591M	Transistor Pair 2SC959 (N.M.L)
H710	HT106061M	Transistor Pair 2SC959 (N.M.L)
H711	HT309591M	Transistor Pair 2SA606 (N.M.L)
H712	HT106061M	Transistor Pair 2SA606 (N.M.L)
H713	HH0000302	Thermistor MT-350
H714	HH0000302	Thermistor MT-350
H715	HD1000105	Diode 1N60
H716	HD1000105	Diode 1N60
H717	HD1000105	Diode 1N60
H718	HD1000105	Diode 1N60
<b>MISCELLANEOUS</b>		
0911	281811806	Spacer
J701	YP1000099	Plug

REF. DESIG.	MARANTZ PART NO.	DESCRIPTION
J702	YP1000099	Plug
J703	YP1000099	Plug
J704	YP1000099	Plug
J705	YP1000099	Plug
J706	YP1000099	Plug
J707	YP1000099	Plug
J708	YP1000099	Plug
J709	YP1000099	Plug
J710	YP1000099	Plug
J711	YP1000099	Plug
J712	YP1000099	Plug
J713	YP1000099	Plug
J714	YP1000099	Plug
J715	YP1000099	Plug
J716	YP1000099	Plug
J717	YP1000099	Plug
J718	YP1000099	Plug
J721	YP1000099	Plug
J722	YP1000099	Plug
J723	YP1000099	Plug
J724	YP1000099	Plug
J725	YP1000099	Plug
J726	YP1000099	Plug
0903	282126701	Heat Sink
0905	286716001	Bracket
0907	282016007	Bracket
0909	282026702	Heat Sink
<b>SEMICONDUCTORS</b>		
H001	HT314452A	Transistor 2SC1445 0 or R
H002	HT314452A	Transistor 2SC1445 0 or R
H003	HT314452A	Transistor 2SC1445 0 or R
H004	HT314452A	Transistor 2SC1445 0 or R
H005	HV0000212	Varistor SV3A
H006	HV0000212	Varistor SV3A
<b>MISCELLANEOUS</b>		
0923	51570305B	P. H. Tapt Screw
0925	51570306B	P. H. Tapt Screw
0927	51100308S	B. H. M. Screw
0921	51100306S	B. H. M. Screw
0929	51570408B	P. H. Tapt Screw
0930	53110501A	Hexagon Nut
P800	YD2854005	P. C. Board Power Supply
	ZZ2854005	P. C. Board Ass'y
<b>RESISTORS</b>		
R801	RA0502013	Trimming 4.7K $\Omega$ B
R802	RT0556214	5.6K $\Omega$ $\pm 5\%$ $\frac{1}{4}$ W
R803	RT0527314	27K $\Omega$ $\pm 5\%$ $\frac{1}{4}$ W
R804	GF0539214	3.9K $\Omega$ $\pm 5\%$ $\frac{1}{4}$ W
R805	RC1033112	330 $\Omega$ $\pm 10\%$ $\frac{1}{2}$ W
R806	RT0524314	24K $\Omega$ $\pm 5\%$ $\frac{1}{4}$ W
R807	GS1020103	200 $\Omega$ $\pm 10\%$ 3W
R809	RW1000503	0.5 $\Omega$ $\pm 10\%$ 3W
<b>CAPACITORS</b>		
C801	EA3350509	Electroly 3.3 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C802	EA1080109	Electroly 1000 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 10V
C803	EA2270359	Electroly 220 $\mu$ F $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 35V

# PARTS LIST

REF DESIG.	MARANTZ PART NO.	DESCRIPTION
P100	YD2854004 ZZ2854004	P. C. Board Buffer Amp. P. C. Board Ass'y
		<b>RESISTORS (All resistors are <math>\pm 5\%</math> and <math>\frac{1}{4}W</math>.)</b>
R101	RT0510214	1K $\Omega$
R102	RT0510214	1K $\Omega$
R103	RT0547414	470K $\Omega$
R104	RT0547414	470K $\Omega$
R105	RT0582414	820K $\Omega$
R106	RT0582414	820K $\Omega$
R107	RT0522214	2.2K $\Omega$
R108	RT0522214	2.2K $\Omega$
R109	RT0511214	1.1K $\Omega$
R110	RT0511214	1.1K $\Omega$
R111	RT0510414	100K $\Omega$
R112	RT0510414	100K $\Omega$
R113	RT0520214	2K $\Omega$
		<b>CAPACITORS</b>
C101	EA1050509	Electroly 1 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C102	EA1050509	Electroly 1 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C103	EV3350251	Electroly 3.3 $\mu F$ $\begin{smallmatrix} +40\% \\ -20\% \end{smallmatrix}$ 25V
C104	EV3350251	Electroly 3.3 $\mu F$ $\begin{smallmatrix} +40\% \\ -20\% \end{smallmatrix}$ 25V
C105	EA1070259	Electroly 100 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 25V
		<b>MISCELLANEOUS</b>
H101	HT309451Q	Transistor 2SC945Q
H102	HT309451Q	Transistor 2SC945Q
J101	YP1000099	Plug
J102	YP1000099	Plug
J103	YP1000099	Plug
J104	YP1000099	Plug
J105	YP1000099	Plug
J106	YP1000099	Plug
P400	YD2577004 ZZ2854104	P. C. Board T. C. Amp P. C. Board Ass'y
		<b>RESISTORS (All resistors are <math>\pm 5\%</math> and <math>\frac{1}{4}W</math>.)</b>
R401	RT0539114	390 $\Omega$
R402	RT0539114	390 $\Omega$
R403	RT0515414	150K $\Omega$
R404	RT0515414	150K $\Omega$
R405	RT0510414	100K $\Omega$
R406	RT0510414	100K $\Omega$
R407	RT0522314	22K $\Omega$
R408	RT0522314	22K $\Omega$
R409	RT0527314	27K $\Omega$
R410	RT0527314	27K $\Omega$
R411	RT0520214	2K $\Omega$
R412	RT0520214	2K $\Omega$
R413	RT0510214	1K $\Omega$
R414	RT0510214	1K $\Omega$
R415	RT0510314	10K $\Omega$
R416	RT0510314	10K $\Omega$
R417	RT0575214	7.5K $\Omega$
R422	RT0522514	2.2M $\Omega$
R423	RT0522514	2.2M $\Omega$
R424	RT0568314	68K $\Omega$

REF. DESIG.	MARANTZ PART NO.	DESCRIPTION
R425	RT0568314	68K $\Omega$
R426	RT0510314	10K $\Omega$
R427	RT0510314	10K $\Omega$
R428	RT0510314	10K $\Omega$
R429	RT0510314	10K $\Omega$
R430	RT0522114	220 $\Omega$
R431	RT0522114	220 $\Omega$
R432	RT0516414	160K $\Omega$
R433	RT0516414	160K $\Omega$
R434	RT0547414	470K $\Omega$
R435	RT0547414	470K $\Omega$
R436	RT0510314	10K $\Omega$
R437	RT0510314	10K $\Omega$
		<b>CAPACITORS</b>
C401	EA3350509	Electroly 3.3 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C402	EA3350509	Electroly 3.3 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C403	EA1050509	Electroly 1 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C404	EA1050509	Electroly 1 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C405	EA1060259	Electroly 10 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 25V
C406	EA1060259	Electroly 10 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 25V
C407	EA3350509	Electroly 3.3 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C408	EA3350509	Electroly 3.3 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C409	EA3360259	Electroly 33 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 25V
C410	EA3350509	Electroly 3.3 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C411	EA3350509	Electroly 3.3 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C412	EA4740501	Electroly 0.47 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C413	EA4740501	Electroly 0.47 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 50V
C414	EA2260109	Electroly 22 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 10V
C415	EA2260109	Electroly 22 $\mu F$ $\begin{smallmatrix} +100\% \\ -10\% \end{smallmatrix}$ 10V
C416	DD1650001	Ceramic 50PF $\pm 10\%$ 50V
C417	DD1650001	Ceramic 50PF $\pm 10\%$ 50V
C418	DD1620001	Ceramic 20PF $\pm 10\%$ 50V
C419	DD1620001	Ceramic 20PF $\pm 10\%$ 50V
		<b>SEMICONDUCTORS</b>
H401	HT307321A	Transistor 2SC732GR
H402	HT307321A	Transistor 2SC732GR
H403	HT104941D	Transistor 2SA494GR
H404	HT104941D	Transistor 2SA494GR
H405	HT307321A	Transistor 2SC732GR
H406	HT307321A	Transistor 2SC732GR
H407	HT104941D	Transistor 2SA494GR
H408	HT104941D	Transistor 2SA494GR
		<b>MISCELLANEOUS</b>
J401	YP1000036	Plug
J402	YP1000036	Plug
J403	YP1000036	Plug
J404	YP1000036	Plug
J405	YP1000036	Plug
J406	YP1000036	Plug
J408	YP1000036	Plug
J410	YP1000036	Plug